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ABSTRACT

Aimed at educational decisionmakers, this report is intended to help close the research-implementation gap by summarizing the results of an extensive review of educational research on variables related to student performance and resource allocation decisions at the school district level. The trends in research findings about factors related to student achievement are used to address 10 important issues in education. Some of these issues are: (1) the importance of schooling; (2) student/school characteristics systematically related to student achievement; (3) mixing students from different socioeconomic backgrounds to improve achievement levels of the disadvantaged; (4) relationship of development in the cognitive and noncognitive domains; (5) difference that teacher-related factors make on cognitive and noncognitive development; (6) the impact of school administrators and supervisors on student development; and (7) financial measures as indications of school quality. The document discusses how the study results are summarized and summarizes and interprets the study findings. A 97-item bibliography lists the studies reviewed. (Author/DN)

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WHAT RESEARCH SAYS ABOUT IMPROVING STUDENT PERFORMANCE

A Manual for Administrators

The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Bureau of School Programs Evaluation
Albany, New York 12224

March 1973

EA 005 407

THE UNIVERSITY OF THE STATE OF NEW YORK

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FOREWORD

An educational system can be viewed in different ways. It is an economic system as well as a social organization. But study of the economic characteristics of educational systems has often emphasized the financial aspects of the system to the neglect of the outcomes the financial transactions are intended to produce. In recent years, this shortcoming has been recognized and addressed by a number of investigators. Their research is characterized by the relating of resources to outcomes in order to understand more completely the "production function" in education. The resulting information may suggest strategies for using educational resources more effectively to achieve desired outcomes.

To provide a clearer picture of research findings, an extensive review of the literature was undertaken by the Bureau of School Programs Evaluation of the State Education Department. Results of the review were published under the title, Variables Related to Student Performance and Resource Allocation Decisions at the School District Level, which is available to persons interested in a detailed and technical survey of research. The present report presents in nontechnical terms the major findings of the review and is intended for a broader audience. More specifically, this report is designed to give school administrators an additional source of information which, when coupled with the insights they have gained through training and experience, may enhance the decision-making process in education.

A report such as this cannot provide definitive answers to all the difficult questions of policy and practice faced by school administrators

today. It cannot replace the human element in weighing evidence and making judgments. It is presented to administrators with the hope that it can provide some insights, based on the experiences of others, which add one more dimension to the complex process of managing educational systems.

A number of people in the State Education Department contributed to the development of the report. William D. Firman, Assistant Commissioner for Research and Evaluation at the time the study began, saw the value of such a report and helped determine the literature to be reviewed. Alan G. Robertson, Director of the Division of Evaluation, provided overall support. David J. Irvine, Chief of the Bureau of School Programs Evaluation, supervised the work and edited the final report.

John J. Heim, an economist formerly in the Bureau of School Programs Evaluation and now Associate for Education Research in the Bureau of Department Programs Evaluation, surveyed the literature and wrote the report.

Lorne H. Woollatt

Lorne H. Woollatt
Associate Commissioner for
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CHAPTER I

Introduction

The period since the late 1950's has seen a tremendous growth in the amount of research into the many factors which affect student achievement. Numerous studies have attempted to isolate the effects of student background and other nonschool factors as well as the impact of various educational policies and practices. As a result, much research has special relevance for educators, especially those at the local level, to assist them in developing more efficient and more effective programs.

However, many research findings on school effectiveness have been slow in making their way into practice. The causes for the lag in application can be found at both ends of the research-to-implementation axis. The research results are not always clear and often are contradictory from one study to another. In addition, what is learned has often not been interpreted in terms that are meaningful to the practitioner. On the other hand, administrators and other school personnel may find that the day-to-day demands on their time do not permit them to critically monitor developments in the research field.

The lag in applying research results is aptly illustrated by the discrepancy between what has been learned by studying the production function in education and the use to which the knowledge has been put. To help lessen this lag, a comprehensive review was completed by the Bureau of School Programs Evaluation of the New York State Education Department.[1]

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[1] "Variables Related to Student Performance and Resource Allocation Decisions at the School District Level." Albany: State Education Department, 1972.

The review integrates the findings of various investigations of determinants of student performance in the cognitive and noncognitive areas. The review also describes the theoretical backgrounds and methods used.

The present report is intended to help close the research-implementation gap further by summarizing the findings of the earlier review with the local school practitioner in mind. The trends in current research findings about factors related to student achievement are used to provide tentative answers to the following questions:

1. The important question: Does schooling matter?
2. What student or school characteristics, largely outside the influence of school authorities, seem systematically related to student achievement?
3. Can a mixing of students from different socioeconomic backgrounds lead to improvement in the achievement levels of lower socioeconomic level students?
4. Is student development in the noncognitive domain related to student cognitive development?
5. Do teacher-related factors seem to make a difference in the cognitive and noncognitive development of students?
6. What impact do school administrators and supervisors have on student development?
7. Is student cognitive or noncognitive development related to variations in the use of special supportive staff?
8. Are instructional materials and educational technology related to differences in student achievement?
9. Is absenteeism related to student achievement?
10. Do financial measures serve as an indication of school quality?

Chapter II of this report describes the manner in which results are summarized. Chapter III summarizes and interprets the findings of the studies reviewed. The bibliography lists the studies reviewed.

CHAPTER II

Methods Used to Summarize the Findings

Almost 100 studies, most of them published since the middle 1950's, were reviewed. They are listed in the bibliography. The studies include findings on 110 variables thought to affect student performance in some way. Because the purpose of chis report is to describe trends in research, those variables appearing in only one study are not dealt with here.

The results of the various studies were summarized by comparing the number of times a variable was found to be related to student performance with the number of studies in which the variable was used. The result was expressed as a percent. Thus, a variable used in 10 studies and found to be related to student performance in eight is reported as being significant 80% of the time. The number of studies in which a variable was used is a key element in this form of reporting since a high percent of significance for a variable used in only a few studies obviously would have less importance than results based on a larger number of studies.

Chapter III presents trends in research by reporting percentages of this type for:

1. All studies reviewed.
2. Studies which emphasized student performance in the cognitive domain, including such variables as reading and arithmetic achievement.
3. Studies which emphasized student performance in the noncognitive domain, including such variables as study habits, self esteem, attitudes toward life, tolerance of others, and citizenship.

The total number of times a variable was used does not equal the sum of the cognitive and noncognitive areas in every case. The differences result largely from the omission of certain studies in which variables were not readily classified as cognitive or noncognitive. See, for example, table 1 on page 7.

The method of summarizing results of research studies admittedly provides an incomplete picture since no breakdown is made within the cognitive or the noncognitive domains. To overcome this problem, chapter IV identifies studies which are representative of the findings under each of the questions. The reader is advised to consult these studies to learn more about the influence of individual variables on specific types of student performance.

CHAPTER III

Research Answers to 10 Questions of Interest to School Administrators

A review of the literature dealing with factors related to student achievement reveals that a considerable amount of research has been undertaken on the topic during the last few years. Indeed, the amount of research, coupled with the complexity of the problem of identifying influences on student achievement, makes it difficult to comprehend trends in the research. For this reason, a comprehensive review of the research can provide coherence to research results.

This report represents a step beyond a technical review of the research literature. It is intended to provide local school administrators and other personnel with a picture of the findings of various investigators. The research findings have been organized around 10 questions as a framework for giving the results greater relevance.

1. The important question: Does schooling matter?

The most general question one can ask about schools is whether they affect student performance. Thirteen studies were reviewed which investigated this question in one way or another. The approach used most often was to determine whether different amounts of schooling affected the test performance of students. A second approach, taken less frequently, was to determine whether schools explain variation in student performance that can not be explained by nonschool factors. In 12 of the 13 investigations reviewed, formal schooling was found either to result in greater student achievement than would have resulted if no formal schooling was

obtained or to explain variation in student performance which could not be explained in any other way.

One study examined the performance of students on tests given at the beginning and end of a particular course of study. Pretest scores were found to be higher for students who previously had taken a course in the subject. However, on the posttest, both those students who had and those who had not had the course previously were found to perform equally well. Hence, the question resolved by the study seems to be whether somewhat redundant formal education affects student performance rather than whether formal education itself affects the development of academic skills.

Overall, then, the evidence supports the contention that schools are doing a job that is not otherwise being done. Given this conclusion, the next step in understanding what causes educational outcomes is to identify the influential inputs.

2. What student or school characteristics, outside the influence of school authorities, seem systematically related to student achievement?

Variables affecting school or student performance can be considered as either fixed inputs or controllable inputs. Fixed inputs are variables which cannot be altered by school personnel over a short period of time. Controllable inputs are variables which school personnel can manipulate. Controllable inputs will be discussed later in this report; the remainder of this section is devoted to a discussion of fixed inputs.

Four fixed inputs often thought to influence student performance are student IQ, student socioeconomic status, student race, and school (or school district) size. Table 1 shows the percent of different types of studies in which specific fixed inputs were found significant. The numbers in parentheses represent the number of studies of each type in which the variable was used.

Table 1

Percent of Studies in Which Fixed Inputs Were Found Significant and the Number of Studies in Which They Were Used

Variable Examined	All Studies	Cognitive Domains	Noncognitive Domains
Student IQ	96% (28)	100% (17)	90% (10)
Student Socioeconomic Status	88% (67)	95% (37)	77% (26)
Student Race	73% (15)	100% (5)	60% (10)
School (or District) Size	30% (10)	14% (7)	0% (1)

Student IQ. Student IQ was found to be significantly related to student performance in 96% of all the studies (28) in which its effect was tested. This is strong evidence that theorists are correct in postulating that variance in student performance is associated with variance in the IQ level of students. The one study which failed to show student IQ as significantly related to student performance was a study of student health habits. Otherwise, whether the study dealt with cognitive or noncognitive outcomes, IQ appeared to be highly important. Hence, it appears that the performance of students, in cognitive areas and in many noncognitive areas, is determined in part by student IQ.

Student socioeconomic status. Socioeconomic status of students also seems to influence student performance. Overall, socioeconomic status was found to be a significant variable in 88% of the 67 studies in which it was used. It appears to be an even more consistent correlate of cognitive achievement (significant in 95% of 37 studies) than of noncognitive outputs (significant in 77% of 26 studies).

Student race. Student race was found significantly related to school output in 73% of the studies in which it was used. The larger the proportion of white students in the school, the higher the level of student achievement in the school. Race was a significant variable in all of the cognitive output studies in which it was used, while among the 10 noncognitive output studies, it was significant 60% of the time. It is doubtful that significance 60% of the time is sufficient to warrant describing a variable as a "determinant of educational performance." At present levels of understanding of educational input-output relationships, such inconsistency of findings relative to a complex variable such as race suggests that much remains to be learned about the real relationship of race to student development in the noncognitive domain.

Little has been said about interrelationships among the fixed input variables themselves. Without pursuing the issue at length here, the question should be raised: Is race a proxy variable which picks variation in student performance due primarily to other factors such as socioeconomic status or the effects of discrimination?

School size. School size is frequently thought to affect school quality. Yet it was found to be significantly related to student performance in only 30% of the studies in which it was used. It was not found to be related to noncognitive output in the one study of that type in which it was used. In only one of the seven cognitive studies reviewed was it found related to student performance. Size was significant in two studies of school adaptability. It appears that school size (either school district or individual school) is neither an asset nor handicap to student performance, though larger schools are probably better able to meet the criterion of providing a greater variety of course offerings to students. This

generalization is most likely to apply within the most commonly found range of school district size; extremely large or small districts may not have been studied in sufficient numbers to warrant such firm conclusions.

To summarize, fixed inputs in the education production process do seem to have an effect on school outputs in both the cognitive and the noncognitive areas. Schools whose students are predominantly low in socioeconomic status or IQ may require greater allocations of resources than other schools in order to produce the outputs society requires.

3. Can a mixing of students from different socioeconomic backgrounds lead to improvement in the achievement level of lower socioeconomic level students?

The average socioeconomic level of all students was related to cognitive performance of individual students in all four of the studies in which the relationship was examined. The findings indicate that performance of individual students tends to be better the higher the average socioeconomic status of students in the school. From a policy point of view, this finding suggests that concentrations of low socioeconomic status students in a school militate against high achievement. Equalizing the socioeconomic level of the various schools in a district may stimulate a higher general level of performance among lower socioeconomic students.

4. Is student development in the noncognitive domain related to student cognitive development?

Efforts to improve the noncognitive development of students may have a positive effect on student academic achievement as well. Eight studies of this sort were reviewed. Each one indicated that student achievement in the intellectual area is related to some aspect of student noncognitive development. The noncognitive variables may be described collectively as student self-concept and attitude toward learning.

5. Do teacher-related factors seem to make a difference in the cognitive and noncognitive development of students?

To answer this question, the findings on teachers' education, experience, socioeconomic status, and verbal ability, and the findings on class size were summarized. The results are given in table 2.

Table 2

Percent of Studies in Which Teacher-Related Factors Were Found Significant and the Number of Studies in Which They Were Used

Variables Examined	Type of Study		
	All Studies	Cognitive Outcomes	Noncognitive Outcomes
Level of Teachers' Education	83% (12)	75% (6)	100% (3)
Teacher Experience	57% (23)	43% (14)	75% (8)
Teacher Socioeconomic Status or Verbal Ability	100% (6)	100% (4)	100% (2)
Class Size	37% (19)	42% (12)	0% (4)

Level of teachers' education. In 83 percent of studies which examined this relationship, it was found that the more highly educated the teacher was, the more impressive was student performance. All of the studies which examined noncognitive output support this finding. In studies of cognitive output, 75 percent supported the conclusion. While administrators will certainly want to assess a broad range of factors which contribute to a teacher's effectiveness, this group of studies suggests that, other things being equal, there is evidence to support policies such as seeking highly educated applicants to fill new teaching positions, developing salary schedules which provide greater monetary rewards to teachers holding advanced degrees, and providing encouragement to teachers who are working toward advanced degrees.

Teacher experience. The years of experience a teacher possesses is also commonly thought to influence student performance. However, in 23 studies reviewed, teacher experience was found to be related to student performance only 57 percent of the time. Examining the results of studies by type of output, however, is useful. Of the 14 studies which investigated the relation between teacher experience and students' cognitive development, 43 percent produced significant results. On the other hand, teacher experience was found to be a significant variable in 75 percent of the eight studies of noncognitive development. Thus, raising the level of teacher experience in a district by seeking more experienced teachers and striving to retain veteran teachers appears to have a better prospect of influencing the noncognitive development of students than their cognitive development. As with the level of teachers' education, there are many other factors which contribute to the overall effectiveness of a teacher. These findings should not be taken as a recommendation to ignore the full array of characteristics when hiring individual teachers.

Teacher socioeconomic status and verbal ability. Teacher socioeconomic status was generally defined in terms of the educational level of teachers' parents. Teacher verbal ability was determined by testing.

Six studies used one or both of the socioeconomic or verbal ability variables. In all six studies in which one or both of these variables were used, they were found to be significantly related to student performance, both cognitive and noncognitive. Hence, the evidence suggests that increases in the average socioeconomic status or verbal ability of a school's teachers may have a positive effect on both cognitive and noncognitive performance of students.

Class size. Class size is frequently considered to have an effect on the ability of the school to educate students. However, evidence to support this assumption was not strong. Overall, class size was found to be significantly related to student performance in only 37 percent of the 19 studies in which it was used. In the cognitive studies, class size was found to be significant less than half the time it was subjected to testing. In the noncognitive area, four studies were reviewed. None showed a significant relationship between class size and noncognitive achievement. Extremely small or large classes, which fall outside the range usually found in public schools, may make more difference, however.

New open school and team teaching arrangements with technological support may make class size studies per se obsolete. Improving teacher quality (as indicated by degree status, socioeconomic level, verbal ability, and to some extent experience) rather than teacher quantity may be the administrative strategy most likely to produce desired changes in students.

6. What impact do school administrators and supervisors have on student development?

Five studies were reviewed which examined the impact of the ratio of principals and other supervisory personnel to students. In none of the four studies dealing with cognitive achievement was the number of principals and supervisors related to student performance. The fifth study indicated that intensity of supervision was associated with student development in the noncognitive domain, specifically the development of habits and attitudes related to responsible citizenship.

7. Is student cognitive or noncognitive development related to variations in the use of special supportive staff?

The term special supportive staff refers primarily to the school's use of guidance counselors, although in four of the 11 studies reviewed it also includes certain other specialist groups such as psychologists and social workers. Overall, the number of special staff per pupil was found to be significantly related to student achievement in fewer than half (45%) of the studies in which it was studied. However, there are substantial differences between the results of studies of cognitive output and studies of noncognitive output. The use of special staff was found to be unrelated to cognitive achievement in four of the five studies in which it was used; in the studies of noncognitive output, special staff was found to be associated with student performance in four of the six studies reviewed. This group of studies suggests, then, that changing the quantity of special staff personnel is more likely to influence the noncognitive development than the cognitive development of students.

8. Are instructional materials and educational technology related to differences in student achievement?

A limited number of studies examined the effects on student performance of different instructional materials, television teaching, or programed instruction.

Two studies were reviewed which investigated the effect of different textbooks in the same subject area on student performance. In both, differences in achievement were found to be related to the textbooks used. The difficulty in translating this finding into practice is the lack of information about the effectiveness of the many specific instructional materials available. However, the results do suggest that some materials

are more effective than others and that determining their effectiveness, while difficult, may be beneficial to students.

Four studies of the effects of television instruction were reviewed. In three of the four studies, the use of television for instruction at the college level was found to result in equal or better achievement than the normal classroom approach.

Programed learning is another alternative to traditional methods of instruction. In two college-level studies, students using only programed learning texts with no teacher assistance were found to perform as well on achievement tests as did students who had been instructed in the usual classroom manner. In each study, it was also found that programed learning required fewer hours of study than traditional instruction to produce equivalent achievement.

As indicated above, the studies reviewed were carried out at the college level. Similarly positive results for the television program "The Electric Company" seem to indicate that television may be an effective learning device at the elementary and secondary school levels. Additional research is needed to clarify the impact of instructional materials and technology on achievement.

9. Is absenteeism related to student achievement?

Student absenteeism from school was found to negatively affect student performance in four of the six studies in which it was examined. Absenteeism is only partially under the control of the school, since it probably reflects a number of community factors including socioeconomic status. The studies reviewed did attempt to control for the socioeconomic status of the students; thus it appears that the relationship found between absenteeism and student achievement at least partially results from

variations in the schools' policy toward absenteeism. Hence, the evidence provided by these studies, though limited and mixed, suggests that efforts to encourage student attendance may result in better student performance.

10. Do financial measures serve as an indication of school quality?

It was shown earlier that student performance was better when the average degree status of teachers, experience of teachers, and the number of special staff per pupil were higher. Since it costs more to obtain teachers with higher degrees and more experience than it does to obtain relatively untrained and inexperienced teachers, school quality can be expected to vary with variations in these expenditures. Similarly, larger numbers of special staff cost more than smaller numbers. In order to optimize the results obtained by the money available, the school administrator needs to know the relationships between the resources he can buy and student performance. To the extent that these relationships can be known and he can act on the information, additional expenditure can result in better performance.

The effect of school district expenditure on educational output is indirect. Money does not influence performance directly; it buys resources which can influence performance. However, this should not be interpreted to mean that high expenditures automatically result in high achievement. The many fixed inputs which impinge upon the schools may cause variations in achievement from school to school even though school expenditure levels are similar. Furthermore, if money is spent to buy resources which are unrelated to student performance, it is obviously not realistic to expect the expenditure to affect student achievement. This may be done intentionally, as when a district decides to absorb typing or laboratory fees

formerly paid by the students, or unintentionally through lack of knowledge of which resources have the most impact on student learning. Finally, variation in cost structure from one community to another can result in differences in school expenditures which are not associated with variation in student performance.

Table 3 presents the five financial variables whose relationships to school performance levels were most often investigated in the studies reviewed.

Table 3

Percent of Studies in Which Financial Variables Were Significant and the Number of Studies in Which They Were Used

Variables Examined	Type of Study		
	All Studies	Cognitive Outcomes	Noncognitive Outcomes
Administrators' Salaries	80%(5)	80%(5)	
Teachers' Salaries	75%(16)	83%(12)	50%(4)
Gross Expenditure Level	43%(30)	35%(17)	50%(8)
Effort Index	17%(6)	100%(1)	0%(5)
Instructional Materials Expenditure per Pupil	0%(3)	0%(3)	

Administrators' salaries. In four of the five studies in which they were investigated, administrators' salaries were found to be significantly related to the cognitive performance of students. Two of the four studies used salary-per-pupil as the variable to be investigated. This type of variable may reflect varying numbers of administrative staff per pupil or different salary levels of a given number of administrative staff per pupil. Since the results cited in an early part of this chapter suggested that the

number of administrators per pupil had little impact on student performance, it seems more reasonable to conclude that the salary level of administrators is the important factor.

Attempts were made in all these studies to control for the socio-economic level of the community. Therefore, the probability seems small that the findings merely indicate the wealthier districts' ability to pay higher salaries.

Ideally, differences in administrators' salaries should reflect differences in the abilities of the administrators. We are more willing to pay a person a high salary if he is highly capable. However, even after correcting for such things as the wealth of district, administrators' salaries are only an indirect and imprecise measure of ability. On the other hand, the quality of administrators (to the extent that it is reflected in salary level) appears to be one explanation for positive relationship between salary and student achievement which was found in these studies.

Teachers' salaries. Teachers' salaries were found to be positively related to student performance in 75 percent of the studies in which the variable was examined. Since it was found that the major characteristics which determine teacher salary (degree status and experience) were strongly related to student performance, this result should not be surprising. The relationship between teachers' salaries and achievement is especially strong in the cognitive area. The more ambiguous findings in the noncognitive domain (two of the four studies showed significant results) are difficult to explain in light of the findings discussed earlier which showed that degree status and experience are related to noncognitive output.

Gross expenditure level. A major concern of educators is the relationship between school expenditures and student performance. Thirty of the studies reviewed examined this relationship and over half of them reported no obvious relationship between performance and expenditure. Such results have led many observers to question whether the money spent on education influences the quality of that education. Such interpretations ignore the difficulty of obtaining meaningful information from gross expenditure figures.

Highly aggregated expenditure data tend to obscure the impact of any specific expenditure. In addition, gross expenditure figures usually include a number of expenditures not necessarily intended to affect achievement, such as expenditures for transporting students to and from school.

Many of the studies reviewed used instructional expenditures to examine the cost-quality relationship. This type of variable eliminates many items not intended to influence learning, but does not eliminate the problem of relating specific expenditures to specific outcomes. If, for example, a study shows that instructional costs are related to student performance, does it mean that all instructional items affect student performance, or only some of them? Conversely, if a study finds no relationship between instructional costs and achievement, does that indicate that none of the individual items purchased with those expenditures affected achievement? Such general findings are of little value to the school administrator as he allocates available funds among a variety of materials.

These problems can be dealt with more adequately as cost accounting procedures become more widespread in the schools. Lacking such systems, researchers and administrators can obtain some insight into the relation

of expenditures to student performance by examining those variables which are related to student performance. Although this approach is less precise than one which would produce genuine cost/benefit data, it is a first step. The results discussed here can serve in this way as a basis for some tentative conclusions.

Findings cited earlier indicated that the relationship of class size to student performance appears to be less firmly established than the relationship of degree status of teachers to student performance. Thus, seeking teachers with higher degrees appears to be a more efficient use of funds than reducing class size by relatively small amounts.

The problem becomes more difficult when the administrators must decide how to allocate funds between two items, both of which are positively related to student performance. The problem then is to determine which investment would be most cost-effective, that is, which would have the most impact on student performance for each dollar spent? Very few of the studies reviewed dealt with this problem.

The findings of two studies indicated that increasing principals' salaries had a greater probability of producing gains in student performance than if the same amount of money was used to increase teachers' salaries. In another study,the findings indicated that employing teachers with superior verbal ability was five to ten times more effective per dollar spent than employing highly experienced teachers as a means of increasing student performance.

Although these findings are extremely tentative, they may illustrate the problems involved in allocating funds efficiently.

Educational effort index. One of the more interesting financial variables examined is the effort index. This variable represents the ratio

ot school tax levels to a measure of the wealth of the community. A higher ratio indicates that a greater educational "effort" is being made by the community. In the one cognitive output study in which it was used, it was found to be significantly related to student performance. However, in none of five noncognitive studies was it found to be related to student performance.

Little can be concluded on the basis of so few studies. A variation on an effort index, tax leeway, has been found to be related to various school processes;[2] however, its relation to student achievement was not investigated in the studies reviewed. Although community effort may be important from the standpoint of gaining public acceptance of and support for school programs, an effort index may be too gross to be useful to administrators as they make decisions about the specifics of school district operations.

Instructional materials expenditures. The last financial variable in table 3 is instructional materials expenditures per pupil. This variable was used in three studies. None of the studies showed a positive relationship between expenditures for instructional materials and cognitive achievement. The small number of studies makes it difficult to assess these results. Interpretation is further complicated by the fact that expenditures are not broken down by type of material (films versus textbooks, for example) or by the reason for making the expenditure (to acquire more materials or to replace worn-out materials).

One other study, not included in table 3, found that the number of

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[2] See, for example, Truman M. Pierce, Controllable Community Characteristics Related to the Quality of Education. New York: Metropolitan School Study Council, 1947, pp. 72-73.

textbooks used was positively related to the performance of students. To the extent that expenditures for instructional materials represent a measure of the quantity of such materials, this finding may be partial evidence that expenditures for instructional materials affect student performance. Such indirect results must still be balanced against the lack of significance found in the three studies of the impact of expenditures for instructional materials.

CHAPTER IV

Conclusion

These, then, are some of the findings of educational researchers. The purpose of this report was to use the trends in research findings to address 10 important issues in education. It is hoped that this presentation will be of value to educational decision makers.

However, these results are based on other people's experiences in other places at other times. The local school administrator will want to keep this fact in mind as he judges the relevance of the results to the situations he faces.

Generalizations, such as those drawn from research findings in this report, can serve as a foundation for making decisions. They can be combined with the judgment the decision maker has developed through training and experience and his analysis of the salient factors of a specific situation. As one consideration, rather than the only consideration, research findings provide an additional dimension to decision making.

Since this report summarizes the literature only in terms of percentages and numbers of studies showing certain relationships, it necessarily oversimplifies. More detailed descriptions of the results can be found in the review upon which it is based.[3] In addition, specific relationships can better be understood by referring to the original studies. For readers who wish to consult the studies themselves, table 4 lists a few of the studies that provide a basis for the findings on each of

[3] "Variables Related to Student Performance and Resource Allocation Decisions at the School District Level," op. cit.

the major questions discussed above.

Table 4

Representative Studies Contributing
To the Research Findings on 10
Questions of Interest to Administrators

Question of Interest	Representative Studies*
1	58,60,61,19
2	15,19,48,49,52,57,69
3	4,19,50,84
4	15,19,36
5	4,15,19,48,49,53,54,57
6	13,15,49,51,53
7	13,15,44,49
8	4,41,58,60
9	15,44
10	15,48,52,54,76

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